Strategic assessment and economic evaluation: The case study of Yanzhou Island (China)

sustainability

MDPI

Article

Strategic Assessment and Economic Evaluation: The Case Study of Yanzhou Island (China)

Marta Bottero [1,*], Elena Comino [2], Federico Dell'Anna [1], Laura Dominici [2] and Maurizio Rosso [2]

[1] Department of Regional and Urban Studies and Planning, Politecnico di Torino, 10125 Torino, Italy; federico.dellanna@polito.it

[2] Department of Land, Territory and Infrastructure Engineering, Politecnico di Torino, 10129 Torino, Italy; elena.comino@polito.it (E.C.); laura.dominici@polito.it (L.D.) maurizio.rosso@polito.it (M.R.)

* Correspondence: marta.bottero@polito.it

Received: 27 December 2018; Accepted: 12 February 2019; Published: 19 February 2019

check for updates

Abstract: This paper proposes an interdisciplinary multi-level decision-making procedure for supporting an ongoing process of rural development of Yanzhou Island (China). A multi-methodological evaluation approach based on the combined use of different evaluation tools has been developed in order to take into account the economic, social, environmental and cultural aspects of the planning process. An experts' panel has been involved in research since the preliminary phases of the evaluation with the aim of helping the structuring of the decision problem and discussing the outcomes of the analysis. The proposed approach allowed to understand the potentials and weaknesses of the area and to design the most suitable solution for the case study selected. The interdisciplinary nature of this process had given the opportunity to co-design and re-define the master plan in line with the expressed priorities. The master plan of the new district encourages landscape enhancement and promotes the economic development, proposing to grow tourism activities and wellness facilities in a natural place.

Keywords: A'WOT; Multi-Criteria Analysis; SROI; natural system; social benefit; sustainable development

---

1. Introduction

According to Costanza et al. [1,2], a well-established relationship exists between the land-use change and the healthiness of the environment. In this context, the concept of ecosystem services helps to understand the important role of natural systems for human societies; indeed, ecosystem services refer to benefits produced, directly or indirectly, by natural systems [3–5] and they can be also considered as indicators of healthiness and livability of an area. In 2001, the United Nations Millennium Ecosystem Assessment Project divided them into four main groups: provisioning services, regulating services, supporting services and cultural services [6].

Land use change strongly influences ecosystems properties and their services [7] and a dramatic reduction of them has large and negative impacts on human well-being [6,8]. This is also true for cultural services, where the modernization of ancient urban and rural structures affects traditional identities.

In this sense, the valorization of natural areas and the preservation of the environment constitute essential challenges in sustainable land-use planning and they are getting more and more important in the political agenda. As it is well known, sustainable development is a multi-dimensional concept and the evaluation is an interdisciplinary process that connects ecological, cultural and economic disciplines, showing the impact on common resources. In fact, it has been generally agreed that when dealing with sustainability issues, neither an economic reductionism nor an ecological one is possible. Since in general, economic sustainability has an ecological cost and ecological sustainability has an economic cost, integrated frameworks are needed to cope with these issues [9].

In this paper, we present an integrated multi-methodological approach for supporting the decision-making process in the development of the Yanzhou Island (Dinghu District, Zhaoqing, China). Since 2010, the Zhaoqing New Area has undergone a considerable urban expansion, but the island remains almost untouched by radical transformation.

This paper starts from the research carried out in the project: "A design strategy for the redevelopment of the Yangzhou Island in the Zhaoqing New Area, Guangdong Province" that has been developed within the frame of the South China-Turin Collaboration Lab and CeNTO Project at the Politecnico di Torino (Italy). Indeed, in recent years a close collaboration between the Politecnico di Torino and Chinese institutional actors has been structured, thanks to targeted internationalization policies by the University, with the aim of conducting common research activities. Collaborations are mature and consolidated in the field of architecture, and urban and territorial projects have been developed by proposing new activities and developing new mechanisms of project consulting. In particular, the selection of the case study stems from a real need expressed by the Zhaoqing New Area Administration for the definition of a concept plan for the redevelopment of the Yanzhou Island.

According to local government, the aim of the master plan is to consider Yanzhou Island a place mainly dedicated to leisure, tourism and wellness, enhancing local culture and natural environment (Figure 1).

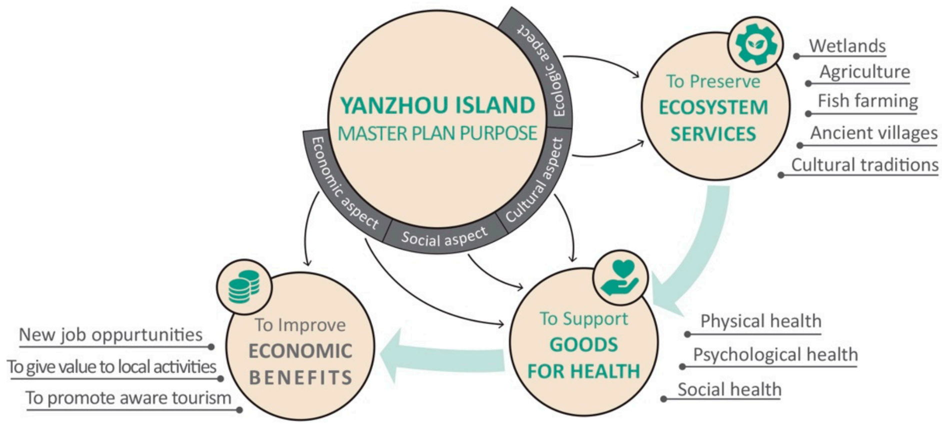

Figure 1. Three main goals of Yanzhou Island's master plan.

It is precisely the reflection on the new tourist models and the recovery of rural villages that has led the Zhaoqing New Area Administration to investigate innovative approaches for the development of the Yangzhou Island. This planning approach is in line with some recent experiences of developing rural villages located on the edge of urban areas—Yuanqian in Xiamen, Zhouzhuang in Hangzhou and Xiabei in Donguang—which promote a new type of urbanization that is attentive to existing conditions and can generate social and economic benefits, trying to respect the culture and local identities [10–12].

In this framework, the proposed multi-methodological approach defines problems and challenges for the territory, evaluates alternative strategies to solve them and proposes guidelines and recommendations for the general master plan development.

2. Multi-Methodological Approach

The main objective of the research is to create a model capable of supporting the decision-making process for the definition of a new "rural" development on the Yanzhou Island. Three possible alternative scenarios will be analysed from the point of view of the multiplicity of values and objectives through a comparative evaluation based on a multi-methodological approach that integrates several evaluation tools [13–15].

In particular, the first step of the evaluation considers the application of the A'WOT method [16], a hybrid tool that combines two common techniques used in decision analysis, namely the AHP (Analytic Hierarchy Process) and the SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. The connection allows to analytically determine the priorities of the SWOT factors in order to make them commensurable and to use them in the evaluation of the alternative project scenarios.

In the second phase, the best performing scenario defined in the first step is analysed from the financial point of view in order to test the feasibility of the project through a Discounted Cash Flow Analysis [17].

In the third and last step, the evaluation model investigates the socio-economic benefits produced by the scenario under examination, assessing ecosystem impacts caused by the redevelopment of the area and economic effects generated by the new functions assumed in the project through the Social Return on Investment (SROI) analysis [18].

2.1. A'WOT

The acronym SWOT stands for Strengths, Weaknesses, Opportunities and Threats and this analysis is based on a logic procedure that allows the data and information of a specific problem to be collected in order to organize the decision-making process [19].

With specific reference to the context of territorial projects, the aim of the analysis consists of the definition of the possible development scenarios for an area, which are derived from the valorisation of strengths and the mitigation of weaknesses, in light of the opportunities and threats which could occur. The analysis distinguishes between endogenous factors of the process, that represent the internal variables, such as strengths and weaknesses, and exogenous factors, that are external from the system, such as opportunities and threats.

It has been recognized that the SWOT analysis can offer the possibility of developing a deep knowledge on the territorial and socio-economic context under investigation that can be useful to address the design strategies. However, it can be stated that the method lacks in offering the opportunity of appraising, in a comprehensive way, the decision-making situation because results are in the form of qualitative statements that cannot be summarised in indexes. With the aim of overcoming the aforementioned disadvantages, an integration of the SWOT with a decision analysis tool named AHP (Analytic Hierarchy Process) has been proposed with the name of A'WOT [16]. In the A'WOT method, SWOT analysis is made more analytical by giving numerical rates to the SWOT factors through the integration with the Analytic Hierarchy Process (AHP) [20] and its eigenvalue calculation technique. This integration provides analytically determined numerical priorities for the SWOT factors and make them commensurable. Moreover, in the A'WOT method the alternative options can be evaluated according to the SWOT elements and they can be prioritized with reference to their global performance.

As stated by Kurtilla et al. [16], the A'WOT method can be developed according to the subsequent steps:

1. To carry out the SWOT analysis.

The first step consists in the organization of the standard SWOT matrix where the relevant elements of the analysis are represented. For the application of the AHP method, the number of elements in each group should be smaller than 10 [20].

2. To develop the pairwise comparisons between the SWOT elements within each SWOT group.

In this step, the elements belonging to each SWOT group are compared and the questions are of the type: "Which of these two elements provide a greater strength (or opportunity, weakness, threat)? And to what extent?". The relative importance values are provided in a 1–9 point scale where the value

1 indicates that the two elements are equally important and the value 9 indicates that one element is extremely more important than the other one. Through these comparisons, the priorities of the elements are computed by means of the eigenvector method.

3. To develop the pairwise comparisons between the SWOT groups.

The four SWOT groups are compared and the questions are of the type: "Which of the two groups is more important for the overall objective of the evaluation? And to what extent?". Again in this case, the priorities of the groups are calculated using the eigenvector method. Finally, the global priorities of the SWOT elements are computed by multiplying the local priorities of the elements defined in Step 2 with the priorities of the related SWOT group defined in the present step.

4. To evaluate the alternative options.

Within the A'WOT framework alternative strategies can be evaluated with reference to the SWOT factors.

Many applications of the A'WOT method exist in the literature especially in the domain of forest [16] and natural management resource [21,22], while the researches in the field of environmental and territorial planning are more limited [23–25].

2.2. Discounted Cash Flow Analysis (DCFA)

The Discounted Cash Flow Analysis (DCFA) is a very well-known method for the feasibility assessment of a project [17]. The method is based on the identification of the full range of costs and incomes of the project in order to allow the investor to be aware if minimum objectives will be achievable.

In particular, this technique is used to derive economic and financial performance criteria for investment projects [26] in the form of synthetic and easy to interpret indicators that allow the Decision Maker to understand if the project should be accepted or rejected. The most used project performance criteria are the Net Present Value (NPV, as shown in Equation (1)) and the Internal Rate of Return (IRR, as shown in Equation (2)).

$$\boldsymbol{NPV} = \sum_{\boldsymbol{t=o}}^{\boldsymbol{N}} \frac{\boldsymbol{B_t^{(f)} - C_t^{(f)}}}{\boldsymbol{(1+r)^t}} \tag{1}$$

$$\sum_{\boldsymbol{t=o}}^{\boldsymbol{N}} \frac{\boldsymbol{B_t^{(f)} - C_t^{(f)}}}{\boldsymbol{(1+r)^t}} = \boldsymbol{0} \Longrightarrow \boldsymbol{r} = \boldsymbol{IRR} \tag{2}$$

In Equations (1) and (2), $B_t^{(f)}$ are the financial benefits in the year t, $C_t^{(f)}$ are the financial costs in the year t, N is the number of years considered in the evaluation and r is the discount rate. In our application, a discount rate of 3% was applied. Moreover, with reference to Equation (1), it is important to highlight that, if the $NPV = 0$ (i.e., the discounted benefits are equal to the discounted costs), we should be indifferent in the decision whether to accept or reject the project; if instead the $NPV > 0$ (i.e., the discounted benefits are larger than the discounted costs), we should accept the project; finally, if the $NPV < 0$ (i.e., the discounted benefits are smaller than the discounted costs), we should reject the project. With reference to Equation (2), mention should be made to the fact that IRR measures the return on invested capital.

2.3. Social Return on Investment (SROI)

The methodology of SROI (Social Return on Investment) aims at measuring changes that a certain project or policy is likely to produce on the whole community [18]. These changes are evaluated by social, environmental and economic outcomes that are estimated using monetary values. The method enables a ratio of benefits to costs to be calculated.

The SROI technique is a very recent implementation of existing evaluation approaches in the context of project, plans and programs and it is based on social accounting and Cost-Benefit Analysis (CBA) [27]. CBA is an economic valuation method for comparing costs and benefits of different project options along their lifetime [28]. By valuing all the impacts into monetary units and discounting them at a specific year, the method allows to screen or to rank alternatives by specific performance indicators, such as the SROI.

In the case of the present research, the SROI method has been implemented for investigating the socio-economic impacts of the best performing solution emerging from the application of the A'WOT and DCFA.

In particular, the method can be developed according to the following process:

1. Definition of costs and benefits.
2. Selection of the estimation method for measuring all costs and benefits.
3. Distribution of costs and benefits over the life of the investment.
4. Conversion of all costs and benefits into a common currency.
5. Discount costs and benefits into present value.
6. Calculate the SROI using the formula reported in Equation (3):

$$\boldsymbol{SROI} = \frac{\sum_{t=0}^{N} \frac{B_t^{(e)}}{(1+r)^t}}{\sum_{t=0}^{N} \frac{C_t^{(e)}}{(1+r)^t}} \tag{3}$$

where $B_t^{(e)}$ is the value of benefits for a period t, $C_t^{(e)}$ is the value of costs for a period t, r is the social discount rate, N is the number of periods [17].

3. Case Study: Application of Multi-Criteria Approach to Yanzhou Island Development

3.1. Description of the Area

The case study focuses on the context of Yanzhou Island, situated in Dinghu District, in the new urban area of Zhaoqing (south of China). It is the biggest island of the Pearl River (Figure 2) and it remains almost untouched by the process of rapid urbanization of the Pearl River Delta Economic Zone (PRDEZ). The Zhaoqing area is commonly known in China for tourism: residents of other cities of the PRDEZ area usually come there for weekend excursions, especially for visiting the architectural heritage and the historical walls of Zhaoqing [29] (Table 1).

Table 1. Socio-economic information (2017 reporting year).

	Zhaoqing	Guangdong	China
Area	14,891 km^2 [a]	179,800 km^2 [b]	9,597,000 km^2 [d]
Population	4.11 million [a]	111.69 million [c]	1386 billion [e]
Gross domestic product (GDP)	220.06 billion RMB [a] (32.60 billion USD)	8970.52 billion RMB [c] (1331.19 billion USD)	82,075.43 billion RMB [e] (12,250.39 billion USD)
Industrial structure (% of GDP)			
Primary sector	14.8% [a]	4.1% [c]	7.6% [e]
Secondary sector	46.9% [a]	42.6% [c]	40.5% [e]
Tertiary sector	38.3% [a]	53.3% [c]	51.9% [e]
GDP per capita	53,674 RMB [a] (7951 USD)	81,089 RMB [c] (12,010 USD)	59,201 RMB [e] (8836 USD)
Value of export	22.23 billion RMB [a] (3.29 billion USD)	3775.35 billion RMB [c] (557.1 billion USD)	15,342.89 billion RMB [e] (2263.33 billion USD)
Value of import	13.57 billion RMB [a] (2.03 billion USD)	2318.08 billion RMB [c] (343.2 billion USD)	12,479.95 billion RMB [e] (1841.89 billion USD)

Note: [a] [30]; [b] [31]; [c] [32]; [d] [33]; [e] [34].

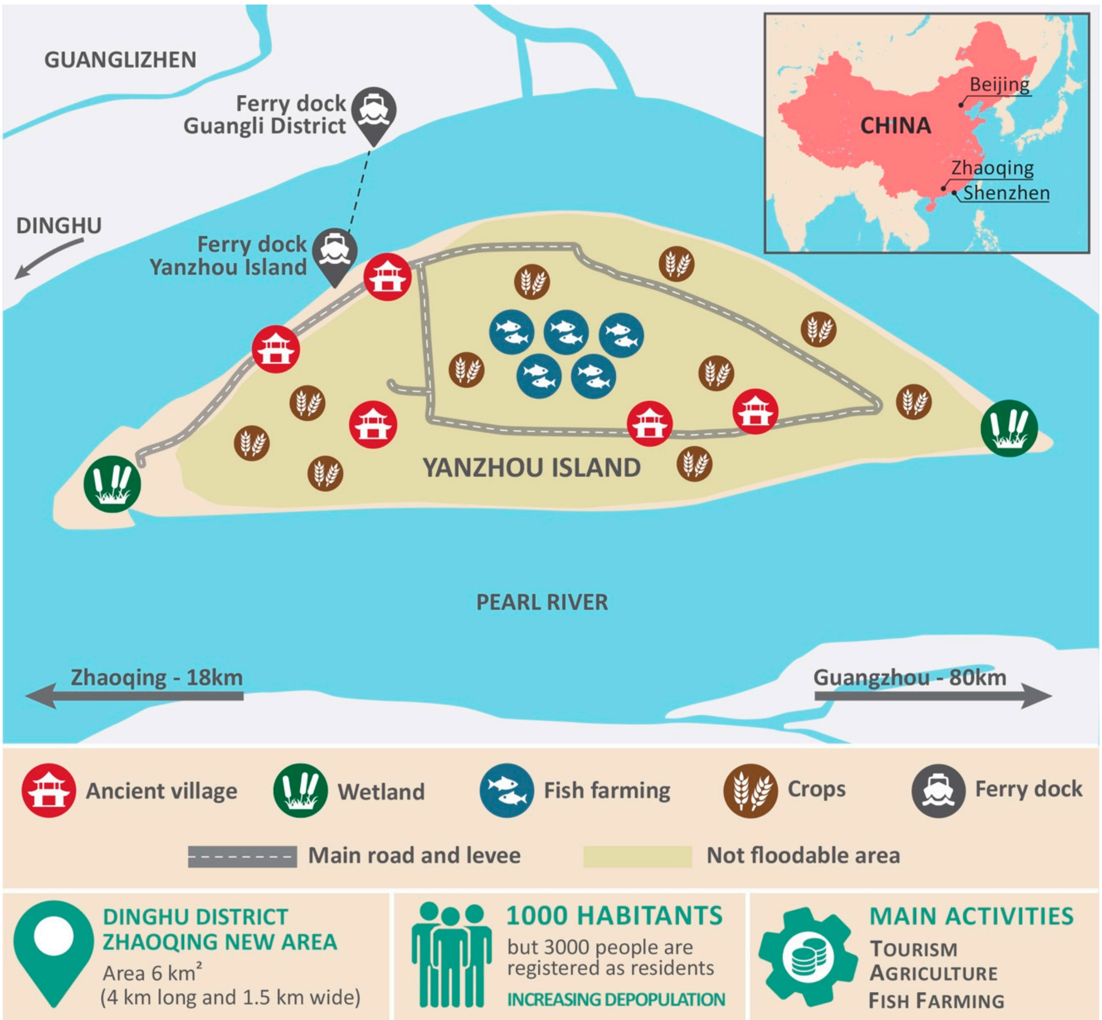

Figure 2. Main features of Yanzhou Island.

Zhaoqing is located in the central-western part of the Guangdong province, one of the most densely populated provinces with the largest absolute population in China. In the last three decades, the Chinese province of Guangdong has achieved a rapid and profound urbanization and industrialization, transforming a purely agricultural reality into a more modern industrial economy (Table 1). Guangdong is in first place for the value of GDP (Gross Domestic Product) and for the value of foreign trade reaching a percentage equal to 10.8% of the total national GDP in 2017 among the Chinese provinces. A per capita GDP equal to 81,089 RMB (about 12,010 USD) well above the national average (59,201 RMB) was recorded in 2017. The structure of the Guangdong economy is characterized by the strong weight of the secondary sector, which contributes to 42.6% of the provincial GDP, and by the dynamic and well-developed service sector, which represents a share of 53.3% of the provincial GDP [35]. The value of the total trade of Guangdong was 62% of the export share and 38% of the import quota. Zhaoqing is located right in the Pearl River Delta area where most of Guangdong's industrial, commercial and service settlements are concentrated [36,37]. The structure of the economy of Zhaoqing is characterized by the secondary sector which, like the rest of the province, contributes about half of the GDP (46.9%), and by the dynamic and well-developed service sector (38.3%). The primary sector contributes to the remaining 14.8% of the city's gross domestic product, with a value of gross agricultural production greater than the national and provincial average. Zhaoqing's Huaiji county represents one of the primary grain production bases in the Guangdong province. According to the Thirteenth Five-Year Plan for Economic and Social Development, a new consumption model based on "internet and agriculture" will be developed. More resources will be allocated in order to increase online sales, evolving the territory into a modern agricultural demonstration area as well as a hub for organic product transactions for the PRDEZ city cluster [38]. Zhaoqing has numerous historical sites and scenic spots at the provincial level. In detail, the area is also home to the first nature reserve in China in Dinghu Mountain, listed by UNESCO as an international biosphere reserve. The economy of Zhaoqing has resisted the process of industrialization that involved the entire province of Guangdong in favor of a traditional economy. In 2013, the city of Zhaoqing in fact requested the revision of the "Historical and Cultural Protection Plan". Following the National New-Type Urbanization Plan (2014–2020), in 2015 the Culture, Radio, Press and Publications Bureau published a plan characterized by a wider vision of the territory with the aim of showing the city as an important cultural center, emphasizing the quality instead of the quantity and the speed of urbanization processes [39].

With an area of around 6 km^2 (4 km long and 1.5 wide), the Yanzhou island presents a rich and complex ecosystem, with its ancient villages, temples, rural areas and wetlands. It is a great ecological and environmental value for the Dinghu area, because it is the second natural area, following the Dinghu Mountains, close to the city. Yanzhou Island is placed 18 km from the Zhaoqing city centre and 80 km from Guangzhou city. The island landscape is composed by a rural village, located along the perimeter, agricultural fields (mainly crops of banana, papaya and mango trees) and aquaculture ponds, located in the middle of the island. Ancient villages are almost abandoned because only 1000 habitants of 3000 habitants registered as residents really live there, as they mostly spend their daily activities in the city of Zhaoqing. The external riverside is periodically flooded: the island presents a surrounding river bank almost fragmented, wetlands and small woods, particularly in the west coast. A widespread network of pedestrian paths, that extends in the central part across fields and ponds, connects the five villages around the Yanzhou island. The main ferry dock for naval transport, that connects the island with the Guangli Residential District, is located on the north coast, close to villages.

3.2. Selection of the Strategy by Means of an A'WOT

To rank and evaluate the most suitable scenario for the Yanzhou Island according to potentials and weaknesses, a hybrid A'SWOT approach is designed. The method assesses a set of alternative scenarios with respect to the criteria from a SWOT analysis. The A'WOT analysis consists of four-step evaluation procedure, as described in Section 2 (Figure 3).

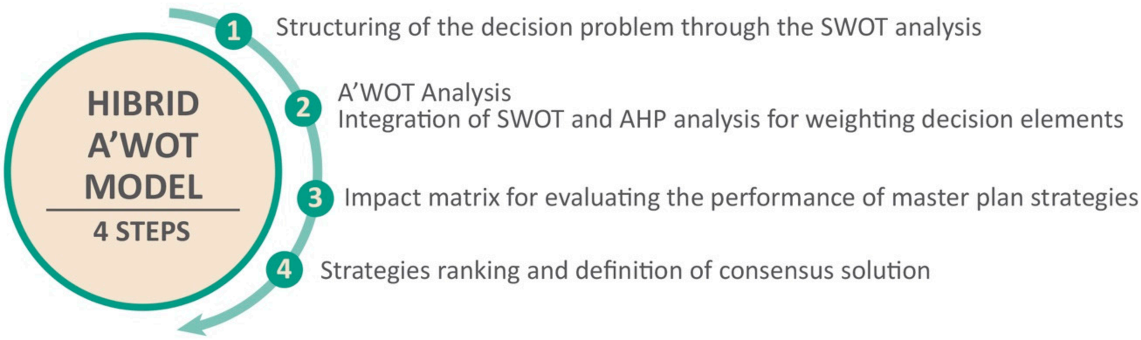

Figure 3. Four stages of hybrid A'WOT model.

3.2.1. SWOT Analysis Framework

In the framework of SWOT matrix, specific and different focus groups with multidisciplinary experts were performed to individuate positive and negative factors affecting Island development, of both internal and external origin. An expert team was constituted of hydro-geology, ecosystem and economic researchers in order to obtain an overall point of view of positive and negative features of alternative projects. Consequently, a SWOT matrix has been created as the result of the group perspective on the item, rather than on a single-subjective perspective.

Individuated factors have been grouped in six major criteria, defined during focus groups, that can be briefly described as follows:

- Hydraulic aspects: these aspects are essential in the area under study;
- Nature and vegetation: the presence of spontaneous vegetation as well the flooding areas are of relevance for the consequences and the implications that can be generated;
- Socio-economic system: this aspect is closely related to the economic evaluation, and it is based on the principle that increasing the life quality will positively affect the economic value of the area;
- Settlement system: it is related to the population that lives in the island;
- Cultural heritage: the presence of historical buildings has been considered as a tool to identify strategies to improve some needs based on sustainable tourism. The cultural themes play a key role in the planning process;
- Mobility: transport network as well as eco-mobility are elements that characterise the area where human being and environmental aspects must be present at the same time.

Starting from the aforementioned aspects, 24 specific key indicators derived from the expert panel have been defined and grouped in the categories of Strengths, Opportunities, Weaknesses and Threats to produce a matrix useful to support the planning procedure and to analyse alternative strategies of Yanzhou Island (Figure 4).

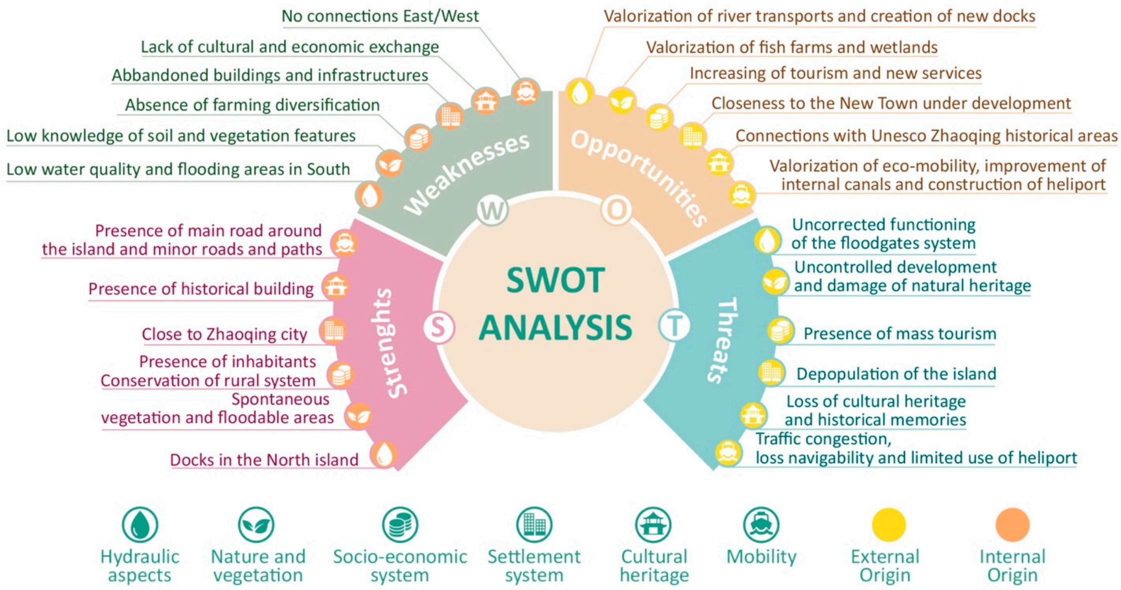

Figure 4. Construction of SWOT (Strengths, Weaknesses, Opportunities and Threats) framework.

3.2.2. Description of Alternative Strategies

The context analysis and the holistic diagnosis implemented through the SWOT analysis, allowed to define three different sub-systems to develop the master plan concept, namely: the agricultural park, the infrastructural ring and the soft perimeter. These three sub-systems are the core of the master plan. The aim is to preserve the local traditional culture, to provide social benefits (attending to repopulate the island) and to stimulate the creation of a sustainable local development. Three alternative strategies are proposed that consider the enhancement of local community, cultural heritage and landscape value (Figure 5).

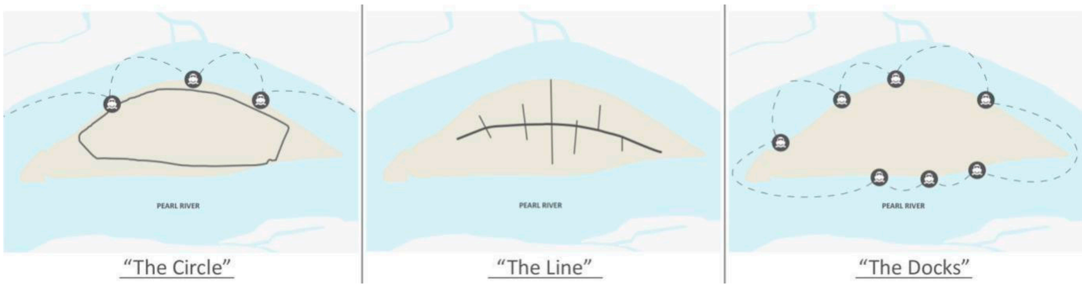

Figure 5. Three strategies for the master plan development.

More in detail, they can be described as follows:

- Strategy 1—"The Circle" is focused on the development of an infrastructural ring that surrounds the island's perimeter. Yanzhou Island presents a discontinuous embankment and strategy 1 suggests to strengthen it, building a continuous infrastructural ring that connects the island's villages with public transport, at the same time providing flooding protection. The aim is also to create comfortable public spaces and new tourist facilities.
- Strategy 2—"The Line" is focused on the development of internal mobility network, that connects the Eastern and Western parts, enhancing the agricultural and fish farming activities. This strategy proposes to design new walking paths, bike lanes and sports facilities to connect different villages.
- Strategy 3—"The Docks" is focused on designing new docks to create new connections with the mainland and to enhance the ferry transport to circumnavigate the island.

These three strategies have been evaluated to identify which of them is the best solution for the master plan.

3.2.3. Evaluation of Strategies Priorities by A'WOT

The SWOT method was integrated with a multi-criteria AHP analysis that allowed one to organize and to weigh factors according to a hierarchy of criteria and sub-criteria to determine the importance of the attributes [40].

For the factors' evaluation, the Expertchoice software (http://www.expertchoice.com/) was used. The elements of SWOT analysis were compared in pairs to each other in order to determine judgments of importance. According to the A'WOT method illustrated in Section 2.1, a focus group comprising experts in ecosystem services, hydraulics, territorial planning and urban economics was composed to perform pairs comparisons and determine the hierarchies of the criteria taken into consideration in the SWOT analysis. In light of the judgments expressed in the pairwise comparison, it is possible to calculate the weights of the groups S, W, O, T and the factors in each group through AHP. The final A'WOT priorities emerging from the focus group are reported in Table 2.

As it is possible to see from the SWOT priorities in Table 2, the experts considered as a key factor the valorization of the Opportunities (O) for the transformation of the island (0.477 of priority in Table 2), while the Strengths (S), Weaknesses (W) and the Threats (T) categories have been given less importance (priorities equal to 0.174, 0.08 and 0.27, respectively). As far as the specific elements are concerned, the experts attached great importance to "Excavation of the bank for creation of new docks" and "Construction of new services for the local population" factors in the Opportunities category (0.114 and 0.113 of priority, respectively).

Table 2. SWOT factors, strategies scores, SWOT priorities, and A'WOT partial and final rankings.

	Strategy 1 Score	Strategy 2 Score	Strategy 3 Score	A'WOT Priorities	Strategy 1 A'WOT Evaluation	Strategy 2 A'WOT Evaluation	Strategy 3 A'WOT Evaluation
Strengths				**0.174**			
Existence of docks in the Northern part of the island	0.6	0.4	0.8	0.007	0.004	0.003	0.006
Presence of spontaneous vegetation	1	0.4	0.4	0.042	0.042	0.017	0.017
Presence of floodable areas	1	0.4	0.4	0.022	0.022	0.009	0.009
Presence of inhabitants	0.6	0.6	0.6	0.004	0.002	0.002	0.002
Conservation of the rural system	0.8	0.6	0.6	0.029	0.023	0.017	0.017
Closeness to the city of Zhaoqing	0.4	0.8	0.4	0.008	0.003	0.006	0.003
Existence of buildings with high historical value	0.6	0.6	0.6	0.018	0.011	0.011	0.011
Presence of a main road around the island	1	0.2	0.2	0.008	0.008	0.002	0.002
Presence of minor roads and paths	0.2	1	0.6	0.012	0.002	0.012	0.007
Strengths partial ranking					**0.117**	**0.079**	**0.074**
Opportunities				**0.477**			
Valorization of river transports	0.4	0.6	0.8	0.015	0.006	0.009	0.012
Excavation of the bank for creation of new docks	0.2	0.6	1	0.114	0.023	0.068	0.114
Valorization of the fish-farming activities	0.8	0.8	0.4	0.008	0.006	0.006	0.003
Protection of floodable areas	1	0.6	0.2	0.037	0.037	0.022	0.007
Increase in tourist presences	0.4	0.6	0.6	0.013	0.005	0.008	0.008
Construction of new services for the local population	0.6	0.6	0.4	0.113	0.068	0.068	0.045
Generation of social benefits and increase in quality of life	0.6	0.8	0.8	0.060	0.036	0.048	0.048
Closeness to the New Town under development	1	0.2	0.2	0.075	0.075	0.015	0.015
Synergies with the Unesco site of the Zhaoqing historic walls and with other historic sites in the area	0.8	0.8	0.8	0.028	0.022	0.022	0.022
Valorisation of soft transport network and eco-mobility	0.6	0.8	0.2	0.044	0.026	0.035	0.009
Implementation of a system of internal canals	0.4	1	0.4	0.097	0.039	0.097	0.039
Construction of a new heliport	1	0.4	0.4	0.015	0.015	0.006	0.006
Opportunities partial ranking					**0.358**	**0.404**	**0.328**
Weaknesses				**0.080**			
Low water quality	0.4	0.4	0.4	0.002	0.001	0.001	0.001
Presence of flooding in the Southern part of the island	0.4	0.4	0.4	0.002	0.001	0.001	0.001
Poor knowledge of the characteristics of soil and vegetation	0.4	0.4	0.4	0.014	0.006	0.006	0.006
Absence of farming diversification	0.4	0.4	0.4	0.003	0.001	0.001	0.001
Presence of abandoned buildings and infrastructures	0.4	0.4	0.4	0.010	0.004	0.004	0.004
Lack of cultural and economic exchanges	0.4	0.6	0.4	0.005	0.002	0.003	0.002
Lack of transport connections East/West	0.2	1	0.2	0.019	0.004	0.019	0.004

Table 2. *Cont.*

	Strategy 1 Score	Strategy 2 Score	Strategy 3 Score	A'WOT Priorities	Strategy 1 A'WOT Evaluation	Strategy 2 A'WOT Evaluation	Strategy 3 A'WOT Evaluation
Weakness partial ranking					**0.019**	**0.035**	**0.019**
Threats				**0.270**			
Uncorrected functioning of the floodgates system	0.8	0.4	0.4	0.007	0.006	0.003	0.003
Uncontrolled development and damage to natural heritage	1	0.4	0.2	0.064	0.064	0.026	0.013
Presence of mass tourism	0.8	0.6	0.2	0.022	0.018	0.013	0.004
Depopulation of the island	0.8	0.4	0.4	0.034	0.027	0.014	0.014
Loss of cultural heritage and historical memories	0.6	0.6	0.6	0.004	0.002	0.002	0.002
Traffic congestion	0.8	0.4	0.8	0.008	0.006	0.003	0.006
Loss of navigability of the river	0.4	0.4	0.4	0.022	0.009	0.009	0.009
Limited use of the airport due to flooding	0.8	0.2	0.2	0.012	0.010	0.002	0.002
Threats partial ranking					**0.142**	**0.072**	**0.053**
A'WOT final ranking					**0.636**	**0.590**	**0.474**

Once the individual sub-factors established in the SWOT analysis were weighed with expert advice, the three alternative master plan scenarios were rated. Each scenario has been evaluated with respect to its performance with reference to each element of the SWOT analysis using a 0–1 points scale where the value 0.2 indicates a very bad performance, the value 0.4 a low performance, 0.6 a moderate performance, 0.8 a high performance and 1 a very high performance. It should be noticed that as far as Strength and Opportunity elements are considered, a high score of the alternative means that the project is able to maximize the S/O elements, while as far as the Weakness and Threats elements are considered, a high score of the alternative indicates the project is able to minimize the W/T elements. The total score of each strategy is determined by summing the partial scores of each group of factors, obtained by multiplying the performance score of the strategy with reference to each SWOT element by the corresponding priority as resulting from the A'WOT evaluation.

According to the results of the evaluation, it is possible to state that Strategy 1 ("The Circle") is the best performing solution for the master plan (priority of 0.636) followed by Strategy 2 (0.590) and Strategy 3 (0.474). For each strategy, the analysis of the individual sub-factors that characterize the specific scenarios makes it possible to identify top and flop elements. This evaluation is useful for identifying the elements to be improved in order to strengthen the preferred strategy by limiting the negative aspects and enhance the positive ones. From the Opportunities point of view, the best scenario is Strategy 2 (score 0.404), while Strategy 1 is second (score 0.358). This means that there are sub-factors in the category of Opportunities that Strategy 1 does not fully capture with respect to Strategy 2. For example, Strategy 1 reaches low scores for "Excavation of the bank for creation of new docks" or "Implementation of a system of internal canals" compared to Strategy 2. In this sense, Strategy 1 should reinforce these design aspects to fill gaps that characterize it. Also from the point of view of Weaknesses, Strategy 2 (score 0.035) turns out to be the best. Also in this case, Strategy 1 should reinforce some aspects such as "Lack of transport connections East/West".

The overall results of the A'WOT evaluation can be also observed by referring to Figure 6 where the four quadrants indicate the SWOT categories and the x and y axis indicate the priorities as resulting from the A'WOT evaluation. In particular, Strength and Opportunity scores are indicated in the second and first quadrants of the diagram, respectively, whereas Weakness and Threat scores are indicated in the third and fourth quadrants of the diagram, respectively. The length of the lines in the different quadrants puts in evidence that Opportunities predominate in the decision process while Strengths, Weaknesses and Threats are less crucial. The points represent instead the position of the strategies in relation to the A'WOT score obtained by multiplying the performance of each strategy against a specific element by the sector weight of the element determined by the A'WOT evaluation.

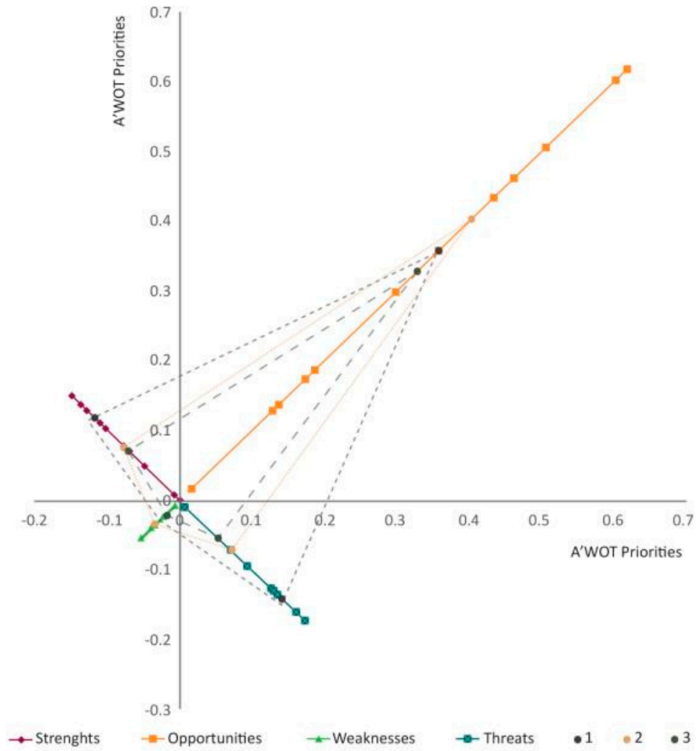

Figure 6. Graphical interpretation of the results of the A'WOT analysis.

As an example, the priority of Strategy 1 with reference of the Opportunities category was estimated to be equal to 0.358. This score is reported in the diagram of Figure 6 for representing the numerical performance of Strategy 1 with reference to the Opportunities category. Analogously, all of the other points for representing the strategies on the A'WOT diagram have been considered.

By the union of points representing the strategies, it is possible to draw an area that indicates how much the strategy in question matches the SWOT factors. The graphic representation of the results of the A'WOT analysis confirms that the defensible scenario is number 1. As shown in the figure, the ring development (Strategy 1) gets the highest priority in S and T groups. Strategy 2 reaches the first position in O and W groups, while the second one in S and W.

3.3. Analysis of the Financial Performance of the Project

The preferred Strategy 1 was analysed from the financial point of view in order to test the financial feasibility of the project through a Discounted Cash Flow Analysis (DCFA) [17]. The development planning has been decomposed into six parts characterized by specific functions. The six areas of the project were combined in five alternative scenarios and analysed from the point of view of financial feasibility considering the costs of operation and the related incomes. The description of specific functions of the six areas is given in Table 3 while Figure 7 provides the location of the areas within the master plan.

Table 3. Description of functional vocation of the master plan areas.

Area	Functions
1	Residences, offices, commercial activities and hotels are sited. A high proportion of infrastructures and public spaces is planned in this part of the island. Furthermore, in the area there are historical buildings that are reclaimed and recovered. A dock that allows connection with the city of Zhaoqing is designed.
2	In this part of island, the highest level of built density is planned. The construction of new residences and the refurbishment of existing ones is proposed. Recreational functions, such as wellness centres, and receptive and commercial activities are designed in the area.
3	A total functional vocation to structures dedicated to recreational activities is provided. This portion represents an important centre where there are mainly spa and wellness facilities.
4	In this area, a dock is planned to allow connection with the mainland. Housing, recreational facilities and commercial activities are planned.
5	In this area, less dense development is expected, mainly characterized by private residences and sports facilities.
6	The area is characterized by public spaces that are combined with housing, commercial, recreational and receptive facilities.

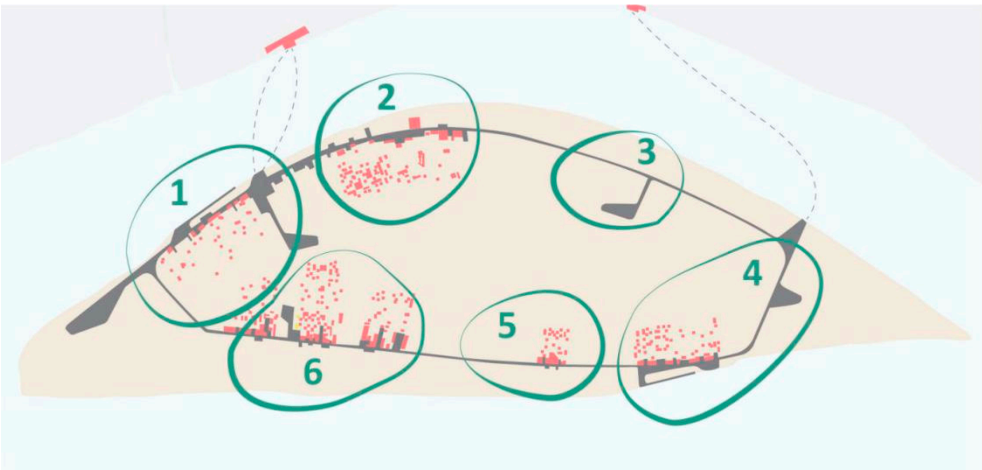

Figure 7. Master plan splitting up in different functional areas.

The six areas were combined in five scenarios according to different development timelines and evaluated from the financial point of view (Figure 8). Scenario 1 provides that all areas are developed subsequently. Scenario 2 assumes the realization of areas 1, 2, 3 and 4, not considering the development in the southern part of the island. Scenario 3 focuses mainly on developing the part to the west of the island including areas 1, 2 and 6. In Scenario 4, it was assumed that development would enhance the part to the west, south and east of the island acting on areas 1, 4, 5 and 6 and ensuring two docks that allow the connection with the mainland. The fifth scenario envisages the development of all areas, except area number 3, which is mainly characterized by recreational functions and financed by private investors. According to the development master plan timeline, the five scenarios were evaluated by the DCFA.

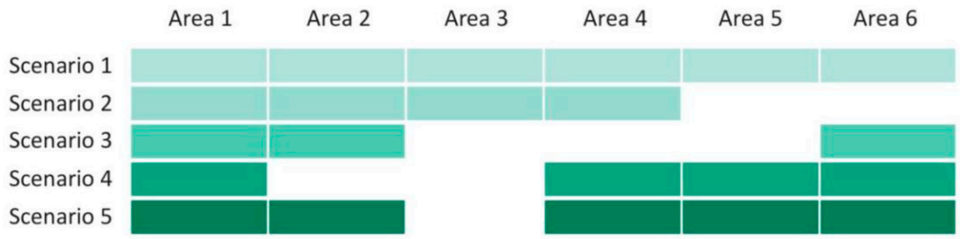

Figure 8. Timeline master plan scenarios development.

With reference to the input of DCFA model, the unitary construction costs were estimated according to a synthetic approach (RMB, Chinese currency) and they were obtained from specific manuals where the unitary construction costs of different works are shown. As far as the incomes are considered, the market price of the residential areas and of the commercial and offices areas were defined according to specific sources of data related to the local real estate market. Table 4 details all the cost and income items considered in the evaluation.

Table 4. Critical variables for the estimation.

Value/Cost	
Costs	
New residence building	5746 RMB/m^2
New office	4517 RMB/m^2
New commercial facilities	4529 RMB/m^2
New hotel	3734 RMB/m^2
New sport facilities	2606 RMB/m^2
New wellness centers	3734 RMB/m^2
Refurbishment residence building	3140 RMB/m^2
Historical place restoration	3140 RMB/m^2
Streets	368 RMB/m^2
Docks	3642 RMB/m^2
Public space (square, open, market, etc.)	232 RMB/m^2
Incomes	
New residence building	16,068 RMB/m^2
New office	13,284 RMB/m^2
New commercial facilities	13,284 RMB/m^2
New hotel	8461 RMB/m^2
New wellness centres	7528 RMB/m^2
Refurbishment residence building	16,068 RMB/m^2
Other Costs	
Management costs for hotel and wellness	50–60% on revenues
Ordinary maintenance costs	5% on construction costs
Extraordinary maintenance costs	10% on construction costs
Selling costs	2% on sales
Discount rate	3%

As shown in Table 4, the cost of the land is not included in the evaluation as we assumed that the public part of the operation will grant the land. Revenues were assumed to include income from entrances to wellness facilities and the sale of hotel rooms. In the part of costs, the annual management costs related to recreational wellness facilities have been considered. The economic profitability indicators by using cash flow estimations rank the five considered scenarios (Table 5). The financial analysis identifies Scenario 5 as the most favourite. Scenario 5 does not consider area 3 in the master plan's development phases. As mentioned above, area 3 is mainly characterized by recreational functions that do not guarantee an immediate economic return on investment. Scenario 1, which intends to develop the entire project, reaches second place given the presence of area 3 that reduces revenues. Scenarios 2 and 3 reach the third and fourth position, respectively. Scenario 4 is positioned at the last place as it does not reach an appropriate financial return excluding the area 2, which provides for the more substantial intervention of the master plan. Despite the scenario that reaches the maximum profitability of the project is number 5, it was decided to prefer Scenario 1, while being slightly less profitable than Scenario 5, it envisages the development of the whole project. By including area 3 in the project we want to emphasize the vocation of the master plan for recreational purposes related to wellness.

Table 5. Net Present Value (NPV) results for the alternative scenarios.

Scenario	Ranking According to NPV Results
1	II
2	III
3	IV
4	V
5	I

3.4. Socio-Economic and Environmental Return of the Operation

With the aim of promoting the Island's development, the paper investigates the socio-economic benefits related to the operation with reference to Scenario 1. The external benefits considered in the analysis refer to the new jobs generated by the planned recreational activities and the added ecosystem value thanks to the reclamation and redevelopment of the area [41,42]. As far as job creation is considered, a documentary research was undertaken to summarize information available on the number of direct jobs resulting from employment in the hypothesized facilities.

Starting from the analysis of the literature, a number of new jobs created for each specific task has been hypothesized and estimated from a monetary point of view (Table 6). With reference to environmental benefits created by the master plan, the reclamation of the central part of the island, and the strengthening of areas dedicated to agriculture and planting of medicinal plants have been considered for the evaluation. In particular, the typical impacts of ecosystem services generated by the reclamation processes of agricultural areas and the return of local ecosystem goods and services are included in the socio-economic analysis and are estimated considering the work of Costanza et al. [1], which provides the monetary evaluation of the annual value of ecosystem services (Table 6). Once the incoming cash flow related to the social benefits linked to new jobs and the increase of the quality of life generated by the ecosystem services was assessed in the economic analysis, the SROI indicator for Scenario 1 was calculated. The SROI ratio is equal to 1.7 that means that every RMB invested yields 1.7 RMB of socio-economic benefits.

Table 6. Estimation of the benefits delivered by the project.

Facility	Number of New Jobs [No.]	Average Monthly Wage for Worker [RMB/Month]	Annual Wage [RMB]
Hotel	40 [a]	2020	969,600
Wellness	100 [b]		2,424,000
Retail	80 [c]		1,939,200
Dock	40 [d]		969,600
Annual benefit for new job	**260**	-	**6,302,400**
Ecosystem	**Surface [ha]**	**Annual benefit [RMB/ha]**	**Annual benefit [RMB]**
Agriculture	149	681	101,469
Wetland	42	108,946	4,466,786
Annual benefit for ecosystem services			**4,568,255**
Total annual benefit			**10,870,655**

Note: [a] five new jobs for each hotel; [b] 20 workers for each wellness facility; [c] two workers for every 500 square meters of retail area; [d] 20 workers for each dock.

4. Conclusions and Future Perspective

This study was undertaken to set a decision framework for the design and evaluation of a suitable development master plan for Yanzhou Island (China). This paper presented an evaluation model able to frame with methodological rigor the project for the enhancement of natural heritage to the urban and landscape scale with a social, economic and cultural view. The master plan concept lays on the generation of an economic system and local development based on the valorization of the landscape according to local cultural approaches [43,44]. Firstly, three alternative strategies were compared by the hybrid A'WOT analysis, in order to identify the most suitable project according to potentials and weakness. Once the most suitable master plan strategy was selected, the DCFA and the calculation of the SROI have been developed in order to assess the financial feasibility and socio-economic impacts of the operation. Mention has to be made to the fact that the results of the evaluation should be interpreted as preliminary and rough materials that could offer a starting point for more specific and deeper analysis.

One of the main strengths of the present work is related to the fact that the evaluation framework proposed in the paper is not shown as a black box that answers questions but as a useful tool for supporting planners in the design process. Indeed, the evaluation process was conceived under a constructive approach [45] which is based on a strong interaction among Decision Makers, experts and analysts and it is able to stimulate a mutual learning process and to reach a consensus solution. Moreover, in the present case, the application of a multi-methodological approach with the involvement of stakeholders also ensured the transparency of the design process, to prevent it from being the result of a top-down planning process [46,47]. Despite the positive results attained in the study, there are several opportunities for expanding the research. Firstly, preliminary estimates for the appraisal of costs and economic benefits, and parametric estimates for environmental assets include weaknesses related to the generalizability of the assessment, the consistency and the accuracy of the evaluations. In this sense, more accurate estimates would be necessary for the evaluation of financial and socio-economic variables for a more advanced planning phase. Secondly, the inclusion of other indirect benefits from territorial development projects could generate a complete view of the impacts of the operation [48,49]. Thirdly, the combination of SWOT with other multi-criteria analysis methods could generate new models to support the decision and to improve the consensus building, which would allow the inclusion of other criteria evaluation scales [22,50]. Fourthly, the integration of decision framework model with GIS (Geographic Information System) technology would facilitate planning decisions at regional scale, through spatial and interactive representations of suitability problems [51,52]. Finally, future work could be developed for the design of the alternative solutions considered in the research. Indeed, the design of alternatives is an essential part of decision making that has been less studied in theory and practice compared to alternatives' evaluation. In this sense, there is a need for better investigating the use of formal approaches to support the design of alternatives solutions for complex decision-making processes, making use of more sophisticated methods such as Conjoint Analysis, Choice Experiments and other specific design methods (see for example [53]).

Author Contributions: Conceptualization, M.B., E.C., F.D., L.D. and M.R.; Methodology, M.B., E.C., F.D., L.D. and M.R.; Software, M.B., E.C., F.D., L.D. and M.R.; Validation, M.B., E.C., F.D., L.D. and M.R.; Formal Analysis, M.B., E.C., F.D., L.D. and M.R.; Investigation, M.B., E.C., F.D., L.D. and M.R.; Data Curation, M.B., E.C., F.D., L.D. and M.R.; Writing-Original Draft Preparation, M.B., E.C., F.D., L.D. and M.R.; Writing-Review & Editing, M.B., E.C., F.D., L.D. and M.R.; Visualization, M.B., E.C., F.D., L.D. and M.R.

Funding: This research received no external funding.

Acknowledgments: This paper starts from the research carried out in the project "A design strategy for the redevelopment of the Yangzhou Island in the Zhaoqing New Area, Guangdong Province" that has been developed within the frame of the South China-Turin Collaboration Lab and CeNTO Project (Polytechnic of Turin). We thank the project coordinators Michele Bonino, Francesca Governa and Angelo Sampieri for the opportunity of the present experimentation.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Costanza, R.; D'Arge, R.; de Groot, R.; Farber, S.; Grasso, M.; Hannon, B.; Limburg, K.; Naeem, S.; O'Neill, R.V.; Paruelo, J.; et al. The value of the world's ecosystem services and natural capital. *Nature* **1997**, *387*, 253–260. [CrossRef]
2. Costanza, R.; de Groot, R.; Sutton, P.; van der Ploeg, S.; Anderson, S.J.; Kubiszewski, I.; Farber, S.; Turner, R.K. Changes in the global value of ecosystem services. *Glob. Environ. Chang.* **2014**, *26*, 152–158. [CrossRef]
3. Dickie, I.A.; Yeates, G.W.; St. John, M.G.; Stevenson, B.A.; Scott, J.T.; Rillig, M.C.; Peltzer, D.A.; Orwin, K.H.; Kirschbaum, M.U.F.; Hunt, J.E.; et al. Ecosystem service and biodiversity trade-offs in two woody successions. *J. Appl. Ecol.* **2011**, *48*, 926–934. [CrossRef]
4. Fisher, B.; Turner, R.K.; Morling, P. Defining and classifying ecosystem services for decision making. *Ecol. Econ.* **2009**, *68*, 643–653. [CrossRef]
5. Qin, J.; Zhou, Y.J.; Krivoruchko, A.; Huang, M.; Liu, L.; Khoomrung, S.; Siewers, V.; Jiang, B.; Nielsen, J. Modular pathway rewiring of Saccharomyces cerevisiae enables high-level production of L-ornithine. *Nat. Commun.* **2015**, *6*, 1–13. [CrossRef]
6. Alcamo, J.; Bennett, E.M. *Millennium Ecosystem Assessment (Program). Ecosystems and Human Well-Being: A Framework for Assessment*; Island Press: Washington, DC, USA, 2003.
7. de Groot, R.S.; Alkemade, R.; Braat, L.; Hein, L.; Willemen, L. Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. *Ecol. Complex.* **2010**, *7*, 260–272. [CrossRef]
8. Bottero, M.; Dell'Anna, F.; Nappo, M. Evaluating Tangible and Intangible Aspects of Cultural Heritage: An Application of the PROMETHEE Method for the Reuse Project of the Ceva–Ormea Railway. In *Integrated Evaluation for the Management of Contemporary Cities*; Mondini, G., Fattinnanzi, E., Oppio, A., Bottero, M., Stanghellini, S., Eds.; Springer: Cham, Switzerland, 2018; pp. 285–295.
9. Munda, G. Social multi-criteria evaluation: Methodological foundations and operational consequences. *Eur. J. Oper. Res.* **2004**, *158*, 662–677. [CrossRef]
10. Lang, W.; Chen, T.; Li, X. A new style of urbanization in China: Transformation of urban rural communities. *Habitat Int.* **2016**, *55*, 1–9. [CrossRef]
11. Wang, R.; Tan, R. Rural Renewal of China in the Context of Rural-Urban Integration: Governance Fit and Performance Differences. *Sustainability* **2018**, *10*, 393. [CrossRef]
12. Wang, M.; Kuang, Y.; Huang, N. Sustainable Urban External Service Function Development for Building the International Megalopolis in the Pearl River Delta, China. *Sustainability* **2015**, *7*, 13029–13054. [CrossRef]
13. Berta, M.; Bottero, M.; Ferretti, V. A mixed methods approach for the integration of urban design and economic evaluation: Industrial heritage and urban regeneration in China. *Environ. Plan. B Urban Anal. City Sci.* **2018**, *45*, 208–232. [CrossRef]
14. Bottero, M. A multi-methodological approach for assessing sustainability of urban projects. *Manag. Environ. Qual. Int. J.* **2015**, *26*, 138–154. [CrossRef]
15. Creswell, J.W. *Research Design: Qualitative, Quantitative, and Mixed Method*; SAGE Publications: Thousand Oaks, CA, USA, 2009; ISBN 978-1-4129-6556-9.
16. Kurttila, M.; Pesonen, M.; Kangas, J.; Kajanus, M. Utilizing the analytic hierarchy process (AHP) in SWOT analysis—A hybrid method and its application to a forest-certification case. *For. Policy Econ.* **2000**, *1*, 41–52. [CrossRef]
17. Manganelli, B. *Real Estate Investing: Market Analysis, Valuation Techniques, and Risk Management*; Springer International Publishing: Cham, Switzerland, 2015; ISBN 9783319063973.
18. Nicholls, J.; Lawlor, E.; Neitzer, E.; Goodspeed, T. *A Guide to Social Return on Investment*; Office of the Third Sector, Cabinet Office: Tokyo, Japan, 2012.
19. Kotler, P. *Marketing Management: Analysis, Planning, Implementation and Control*, 6th ed.; Prentice-Hall International Edition: New Delhi, India, 1988; ISBN 9780132435109.
20. Saaty, T.L. *The Analytic Hierarchy Process*; McGraw Hill: New York, NY, USA, 1980; ISBN 0070543712.
21. Vacik, H.; Kurttila, M.; Hujala, T.; Khadka, C.; Haara, A.; Pykäläinen, J.; Honkakoski, P.; Wolfslehner, B.; Tikkanen, J. Evaluating collaborative planning methods supporting programme-based planning in natural resource management. *J. Environ. Manag.* **2014**, *144*, 304–315. [CrossRef] [PubMed]

22. Kajanus, M.; Leskinen, P.; Kurttila, M.; Kangas, J. Making use of MCDS methods in SWOT analysis—Lessons learnt in strategic natural resources management. *For. Policy Econ.* **2012**, *20*, 1–9. [CrossRef]
23. Pellegrino, D.; Schirpke, U.; Marino, D. How to support the effective management of Natura 2000 sites? *J. Environ. Plan. Manag.* **2017**, *60*, 383–398. [CrossRef]
24. Moharramnejad, N.; Rahnamai, M.T.; Dorbeiki, M. Application of A'WOT method in strategic management of sustainable tourism in a national park. *Environ. Eng. Manag. J.* **2017**, *16*, 471–480.
25. Fagarazzi, C.; Riccioli, F.; Cozzi, M.; Romano, S.; Viccaro, M.; El Asmar, T.; El Asmar, J.-P.; Fratini, R. SWOT-AHP Dynamic Approach to Define Medium Term Strategies to Develop Forest Quality Chain and Forest Energy Chain in Tuscany. *Riv. di Stud. Sulla Sostenibilita* **2015**, *2*, 113–130. [CrossRef]
26. French, N.; Gabrielli, L. The uncertainty of valuation. *J. Prop. Invest. Financ.* **2004**, *22*, 484–500. [CrossRef]
27. European Commission. *Guide to Cost-Benefit Analysis of Investment Projects*; European Union: Brussels, Belgium, 2014; ISBN 9789279347962.
28. Becchio, C.; Bottero, M.C.; Corgnati, S.P.; Dell'Anna, F. Decision making for sustainable urban energy planning: an integrated evaluation framework of alternative solutions for a NZED (Net Zero-Energy District) in Turin. *Land Use Policy* **2018**, *78*, 803–817. [CrossRef]
29. Safina, A.; Carota, F. Yanzhou Island, A Well-being Reserve Inside the Zhaoqing New Area. *Chengshi Sheji* **2017**, *13*, 54–61.
30. HKTDC Research Zhaoqing (Guangdong) City Information—Major Economic Indicators. Available online: http://china-trade-research.hktdc.com/business-news/article/Facts-and-Figures/Zhaoqing-Guangdong-City-Information/ff/en/1/1X000000/1X09W30R.htm (accessed on 21 January 2019).
31. Ministry of Commerce People's Republic of China Guangdong Survey. Available online: http://english.mofcom.gov.cn/aarticle/zt_business/lanmub/200704/20070404613556.html (accessed on 21 January 2019).
32. Statista China: Population by Region 2017. Available online: https://www.statista.com/statistics/279013/population-in-china-by-region/ (accessed on 21 January 2019).
33. The World Bank Surface Area of China. Available online: https://data.worldbank.org/indicator/AG.SRF.TOTL.K2 (accessed on 21 January 2019).
34. National Bureau of Statistics of China Annual Indicators. Available online: http://data.stats.gov.cn/english/easyquery.htm?cn=C01 (accessed on 21 January 2019).
35. Hongbin, Q.; Ho-Por Lam, K. *China's Greater Bay Area*; HSBC Global Research: Hong Kong, China, 2018.
36. Guangdong Provincial and Municipal Government Department Major Social and Economic Indicators. Available online: http://www.gdstats.gov.cn/tjsj/gdtjnj/ (accessed on 21 January 2019).
37. Shi, K.; Chen, Y.; Yu, B.; Xu, T.; Li, L.; Huang, C.; Liu, R.; Chen, Z.; Wu, J. Urban expansion and agricultural land loss in China: A multiscale perspective. *Sustainability* **2016**, *8*, 790. [CrossRef]
38. Zhou, L. Research on Sustainable Development Capacity of University Based Internet Industry Incubator. In Proceedings of the 3rd International Conference on Economics and Management (ICEM 2016), Suzhou, China, 2–3 July 2016; DEStech Publications, Inc.: Lancaster, PA, USA. [CrossRef]
39. Bruno, E.; Federighi, V.; Nguyen, D. Chinese approach in master planning the city wall preservation. The case study of Zhaoqing ancient city centre in perspective with the italian experience. In *Architettura e Città: Problemi di Conservazione e Valorizzazione*; Marmoni, A., Puccini, L., Scandellari, V., Van Riel, S., Eds.; Altralinea Edizioni: Florence, Italy, 2015; pp. 213–221.
40. Bottero, M.; Comino, E.; Riggio, V. Application of the Analytic Hierarchy Process and the Analytic Network Process for the assessment of different wastewater treatment systems. *Environ. Model. Softw.* **2011**, *26*, 1211–1224. [CrossRef]
41. Zhao, M.; He, Z. Evaluation of the Effects of Land Cover Change on Ecosystem Service Values in the Upper Reaches of the Heihe River Basin, Northwestern China. *Sustainability* **2018**, *10*, 4700. [CrossRef]
42. Li, C.; Han, Q.; Luo, G.; Zhao, C.; Li, S.; Wang, Y.; Yu, D. Effects of Cropland Conversion and Climate Change on Agrosystem Carbon Balance of China's Dryland: A Typical Watershed Study. *Sustainability* **2018**, *10*, 4508. [CrossRef]
43. Oppio, A.; Corsi, S. Territorial vulnerability and local conflicts perspectives for waste disposals siting. A case study in Lombardy region (Italy). *J. Clean. Prod.* **2017**, *141*, 1528–1538. [CrossRef]
44. Brunetta, G.; Salizzoni, E.; Bottero, M.; Monaco, R.; Assumma, V. Measuring resilience for territorial enhancement: An experimentation in Trentino. *Valori e Valutazioni* **2018**, *20*, 69–78.

45. Tsoukiàs, A. From decision theory to decision aiding methodology. *Eur. J. Oper. Res.* **2008**, *187*, 138–161. [CrossRef]
46. Roy, B. Decision science or decision-aid science? *Eur. J. Oper. Res.* **1993**, *66*, 184–203. [CrossRef]
47. Roy, B. Decision-aid and decision-making. *Eur. J. Oper. Res.* **1990**, *45*, 324–331. [CrossRef]
48. Ingaramo, R.; Salizzoni, E.; Voghera, A. Valuing forest ecosystem services for spatial and landscape planning and design. *Valori e Valutazioni* **2017**, *19*, 65–78.
49. Bottero, M.C.; Bravi, M.; Dell'Anna, F.; Mondini, G. Valuing building energy efficient through Hedonic Prices Method: are spatial effects relevant? *Valori e Valutazioni* **2018**, *21*, 27–40.
50. Bottero, M.C.; Dell'Anna, F.; Gobbo, G.L. A PROMETHEE-based approach for designing the reuse of an abandoned railway in the Monferrato Region, Italy. *Int. J. Multicriteria Decis. Mak.* **2019**, *8*, 60–83.
51. Torabi Moghadam, S.; Delmastro, C.; Corgnati, S.P.; Lombardi, P. Urban energy planning procedure for sustainable development in the built environment: A review of available spatial approaches. *J. Clean. Prod.* **2017**, *165*, 811–827. [CrossRef]
52. Xu, X.; Schreiber, D.; Lu, Q.; Zhang, Q. A GIS-Based Framework Creating Green Stormwater Infrastructure Inventory Relevant to Surface Transportation Planning. *Sustainability* **2018**, *10*, 4710. [CrossRef]
53. Ferretti, V.; Pluchinotta, I.; Tsoukiàs, A. Studying the generation of alternatives in public policy making processes. *Eur. J. Oper. Res.* **2019**, *273*, 353–363. [CrossRef]